

Can You Afford to Omit CPOE In Future Strategic Plans?

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Since the Institute of Medicine report on medical errors was released in November 1999, health care professionals and the media have given unprecedented coverage to computerized prescriber order entry (CPOE). Although few could argue with the clear evidence that well-designed CPOE systems hold enormous potential to reduce errors,¹ this technology requires millions of dollars to implement and maintain. For example, in the mid-1990s, the CPOE system at Boston's Brigham and Women's Hospital cost about \$1.4 million for in-house development and hardware and at least \$500,000 per year for maintenance. Although this dollar outlay seems staggering at first glance, the cost savings that accompany CPOE are even more impressive—between \$5 and \$10 million per year at Brigham and Women's Hospital.²

How are such large cost savings achieved? Just a glimpse into CPOE using the following scenario can quickly demonstrate its power to vastly improve care and reduce costs.

A physician logs on to the CPOE system to print a list of all patients on his service before morning rounds. He is immediately presented with an alert about a crucial dose modification for one of his patients taking gentamicin with a low creatinine clearance based on today's laboratory values. With the click of a mouse, the physician enters the appropriate patient screen and makes the suggested dose modification. As he attempts to leave the patient profile, the system also suggests or-

dering appropriate follow-up creatinine levels.

As rounds progress, most orders are straightforward and are easily entered into the system. Other orders trigger assistance, reminders, or alerts as appropriate. For example, when the physician orders total parenteral nutrition, the system calculates the additives based on the patient's most current laboratory values, age, and weight. When the physician prescribes a histamine H₂-blocker, a screen succinctly explains a recent formulary change and the physician readily orders the hospital-selected H₂-blocker at the dose suggested.

At one point, the system alerts the physician to a positive sputum culture and suggests appropriate medications while it considers sensitivity information, drug interactions, and patient allergies. For another patient, the physician orders laboratory studies and easily instructs the system to page him, via a beeper number already in the computer, as soon as the results are available.

When a patient is discharged, a template appears on the screen with all of his or her current drug therapy(-ies) for review. After any necessary revisions, the physician prints a copy for the patient.

After rounds, the physician prints patient-specific information sheets to give to covering physicians for reference. If a covering resident overrides a serious dose alert (e.g., chemotherapy), the order is electronically conveyed to a senior staff physician, who must cosign the order before implementation.

Later during office hours, the physician diagnoses community-acquired pneumonia in an elderly patient and notifies the hospital of admission. He ac-

cesses the hospital CPOE system from his office and easily reviews information about prior hospital care.

If a standard order set or pathway has been established for community-acquired pneumonia, the system displays an admission template with order options so that the physician can check the parameters for each order. If there are no standard orders and he prescribes a third-generation cephalosporin, the system prompts him for an indication and suggests another available choice that would reduce the risk of resistant strains. Additional prompts may suggest drug levels for certain antibiotics prescribed and low-level anticoagulation therapy if the patient is on bed rest.

Each order is immediately transferred to the nursing unit and pharmacy, thus avoiding problems with delays, verbal orders, illegible handwritten orders and signatures, error-prone transcription, and time-consuming order clarification. By the end of the day, the physician has spent about 27 minutes using the CPOE system, about the same amount of time that was previously spent with paper-order systems.³

The overall financial impact at Brigham and Women's Hospital from CPOE was further broken down by specific interventions.³ Over one year, for example, enhanced allergy warnings and drug-drug interactions resulted in cost savings of \$500,000 and \$160,000, respectively. Simply displaying laboratory charges averted about \$1 million in expenses, and alerting prescribers to redundant laboratory orders saved another \$75,000. When the physician was ordering human growth hormone, specific guidance resulted in an 85% reduction in orders and a cost saving of \$177,000 in charges. Similarly, the hos-

pital saved \$500,000 after 92% of prescribers switched to an effective but less costly dosing frequency of ondansetron, as suggested by the system. Another \$640,000 in costs was saved through suggestions to change doses based on the patient's renal function and age.

These and many more examples point to real bottom-line savings when CPOE systems are fully maximized. Further, these savings relate to costs associated with extended length of stay and additional tests and treatments. The system does not account for costs to the patient or health system for disability attributable to adverse outcomes.

To help offset the initial costs of error-reducing technology, Senators Bob Graham (D-Florida) and Olympia Snowe (R-Maine) recently introduced a bill that would make \$97.5 million in grants available from the years 2002 to 2011 to assist hospitals and skilled nursing homes. Senator Charles Schumer (D-New York) also plans to introduce similar legislation to fund CPOE. Senator Snowe notes that every day lost in implementing new technology means more lives lost.

In conclusion, although CPOE is relatively expensive to implement and vendor systems today may not perform at the precise level described in this article, we can no longer use financial constraints as a compelling reason to avoid such expenses in our strategic plans for the future. CPOE is a cost-effective solution. ■

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